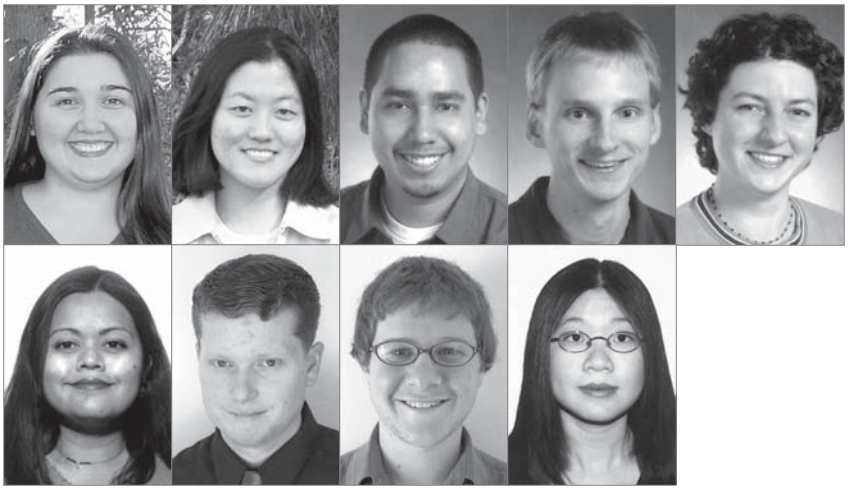
Undergraduate Research



at the University of California

It Starts Here

March 3-4, 2003

UNIVERSITY OF CALIFORNIA

1868

UC Davis
UC Berkeley
UC San Francisco
UC Merced
UC Santa Cruz
UC Santa Barbara
UCLA
UC Riverside
UC Irvine
UC San Diego

It Starts Here

UC Day is sponsored by the Alumni Associations of the University of California (AAUC). The AAUC is the umbrella organization for all of the Alumni Associations of the University of California, working together to support the University's mission of teaching, research and public service. Each of the eight undergraduate campuses collaborated with the UC Office of Research to select representative students to come to Sacramento for UC Day to share the excitement of their research.

The 18 undergraduate researchers selected to present their research at this year's UC Day exemplify this year's theme: "It Starts Here". These honorees are at the early stages of their careers and represent all the potential that undergraduate education at the University of California can offer. Along with their academic focus and research findings, their individual experiences and perspectives help contribute to building impressive foundations from which to develop leadership skills and scholarship that can enhance life for all Californians.

Undergraduate research is vital to the well-being of California, and the nation. The UC undergraduates invited to participate in this year's UC Day are representative of California's new generation of researchers and are evidence of the concept that "It Starts Here".

Undergraduate Student Honorees

Berkeley
Viengkham Malathong, Chemistry
Towards the Synthesis of a Biomimetic Bone Substitute

Sterling Nesbitt, Integrative Biology
Investigations into the Moenkopi Formation's Vertebrate Fauna

Leila Takayama, Cognitive Science and Psychology
Context-Aware Computing for Emergency Response

Davis
Yung Ching (William) Chung, Psychology
Cross-Cultural Study of Nighttime Fears and Simple Phobias from an Evolutionary Perspective: Sexual Dinichism in Antipredatory Behavior

Julie Mai Tran, Biological Sciences
Analysis of HLA Class I Genes in Hepatitis C Clearance

Irvine
Emily Beth Slusser, Psychology
Early Childhood Gender Differences in Various Dimensions of Social Behaviors

Michael Williams, Computer Engineering
A MEMS Based Telemetry System for Longitudinal Muscle Contractions in the Human Esophagus

Los Angeles
Tauheedah Baker-Jones, History
Black, White, or Gray: A History of the Duality of Afro-American Religion

Miguel A. Jimenez, Chemistry
A Study of the Oxidation of DNA: Oxidation of 8-Oxo-Guanosine by Singlet Oxygen

Riverside
Lynell Gutierrez, Chemical Engineering
Patterned Neural Networks for Detection of Brain Functions

Star Lee, Neuroscience
NMDA Receptors Mediate Feeding Elicited by NPY in the Lateral and Perifornical Hypothalamus

San Diego
Ernesto Martinez, Ethnic Studies of Economics
Migrant Farm Workers Stuggle for Survival: Alcohol Use and Abuse in Mecca, California

Michael Moewe, Electrical Engineering
Control of Etch Parameters in Optical Nanostructures Using CAIBE

Melanie Zauscher, Environmental Chemistry
Age Determination of Bowhead Whales Through Aspartic Acid Racemization

Santa Barbara
Roxana Hernandez, Environmental Studies and Geography
Is There a Link Between Eutrophication and Pseudo-nitzschia Multiseries Blooms?

Roger Thompson, History
Xenophobia, Anti-Unionism, and Anticommunism: The Red "Scare" in Los Angeles, California, 1919-1920

Santa Cruz
Max Bell Alper, American Studies
En/Abling Technologies in Dis/Abling Structures

Winnie Chan, Molecular, Cellular and Developmental Biology
Identification of Cytoplasmic Tail Sequences that Regulate Class I MHC Recruitment into the Immunological Synapse and T-Cell Activation

Towards the Synthesis of a Biomimetic Bone Structure

Designing a More Biocompatible Bone Substitute

Bone tissue replacement is one of the most common medical procedures performed, yet current therapies fall short of providing patients with an implant material that is similar to natural bone. Artificial bone substitutes such as metals, ceramics, and plastics suffer from mechanical property mismatch and lack of biological interactions with their natural bone environment. Our research group is interested in pursuing biomimetic synthesis of bonelike materials using natural bone as a guide. Bone tissue is a complex combination of a collagen template providing resiliency to bone and calcium apatites responsible for bone's "toughness". Hydrogels are suitable candidates for the fabrication of functionalized bonelike materials. Recently, poly(2-hydroxyethyl methacrylate) or pHEMA polymers have emerged in a variety of biomedical applications such as contact lens and drug delivery carriers. Its established biocompatibility, porous nature, 3-dimensionality and water retention ability make it a useful scaffold for cell seeding and tissue ingrowth. The chemical modification I make to these pHEMA-based hydrogels involves installation of anionic ligands that mimic the acidic phosphoproteins found in bone matrix. These phosphproteins are believed to induce the nucleation of calcium apatite crystals onto the collagen scaffold of bone. Mineralization techniques have been developed and performed on the sythesized anionic hydrogels to establish high-affinity mineral deposition into the gels. The synthetic integration of an organic component (the pHEMA polymer backbone) with inorganic materials (calcium apatites) opens the opportunity for a new generation of bone substitutes with improved mechanical properties and enhanced biocompatibility.

Biography

I am currently a senior studying chemistry at the University of California, Berkeley. I discovered my love for chemistry early as an undergraduate and began taking part in research the summer after sophomore year. Two valuable internships in the biopharmaceutical industry allowed me to experience the exhilaration of drug discovery and seeded my career interest in medicinal chemistry. In junior year I joined the lab of Professor Carolyn Bertozzi and worked on the design and synthesis of artificial bonelike materials. Academic research presented the opportunity for me to build independence in the laboratory and confidence to explore my own innovations. After graduation, I plan to pursue an advanced degree in the discipline of synthetic organic chemistry.

Faculty Mentors: Professor Carolyn Bertozzi
Co-author: Professor Jie Song

Viengkham Malathong

Major: Chemistry

Research experience provided me with priceless mentorship and an environment that encourages hard work, discipline and motivation to achieve great science.

Investigations into the Moenkopi Formation's Vertebrate Fauna

New Animals Fill Gaps in Evolution of North American Fauna

Berkeley is known for its great collections of later Mesozoic age fossils, including the famous dinosaurs. Few know that Berkeley also has an amazing collection of vertebrates from the early Mesozoic, before the dinosaurs ruled the planet. A diversity of animals that have no modern representatives lived for millions of years before the dinosaurs. New discoveries of these animals have renewed interest in unanswered questions. My fieldwork in the upper Moenkopi Formation (Early Mesozoic) of Arizona has produced an extinct new fauna made up of giant amphibians, sailbacked reptiles and other interesting reptiles. The Moenkopi fauna represents a very important transition from a primitive fauna dominated by giant amphibians and primitve reptiles to a more modern fauna consisiting of crocodiles, turtles, lizards, mammals, birds and dinosaurs. The Moenkopi fauna fills gaps in the evolution of North American faunas and provides information on other faunas around the world. Currently, my field project in the Moenkopi Formation has led to the discovery of a skeleton of a crocodile-like animal named Arizonasaurus. Arizonasaurus is a carniverous, upright, quadrupedal, sailbacked reptile that was at the top of the Triassic foodweb prior to the dinosaurs. The discovery of Arizonasaurus is of great scientific value because Arizonasaurus will help us better understand the relationships of a group of animals closely related to crocodiles. Animals similar to Arizonasaurus are rare and poorly known. Therefore, Arizonasaurus can be used to identify previously unrecognized animal groups and give new information on the evolution of crocodile-like animals.

Biography

I grew up in Mesa, Arizona. I am from a family of four with a younger sister who just started college. I play tennis, paintball, softball and guitar when I find time. I have always been interested in biology and how nature works. My interest in research paleontology began when I was small. I am currently a junior attending UC Berkeley and plan to major in Integrative Biology and minor in Geology. I intend to become a professor to teach geology and paleontology. Currently, I am running field expeditions into the Moenkopi Formation (Early Mesozoic) with students and volunteers in order to search for important vertebrate fossils.

Faculty Mentor: Professor Kevin Padian

Sterling Nesbitt

Major: Integrative Biology

Working on research projects with graduate students and professors has taught me important concepts and given me valuable experience that will be very helpful in my path to become a professor of paleontology.

UCB

Leila Takayama

Major: Cognitive Science and Psychology

As a member of the Group for Interface User Research, I have found an interesting niche in the academic research world which I plan to pursue in my future graduate studies and career.

Context-Aware Computing for Emergency Response

Tools for Improving Firefighter Emergency Response Effectiveness

While traditional computer sytems have been restricted to the desktop, the advent of new technologies has given us the capability to gradually move into a world of "ubiquitous computing" in which computers are able to step out into the world and be of use away from the desktop. Our goal is to design, test, and build context-aware ubiquitous computing applications for firefighters. We are exploring the ways in which such computing applications may support firefighter communication and safety. Upon completion of the first round of field studies with firefighters from three different fire departments and of various department rankings, we have begun to design and test user interfaces of context-aware applications. Most fire departments use a para-military organizational process of well-defined ranks and roles for delegating responsibilities efficiently. We chose to start by focusing upon the role of Incident Commander, who coordinates the overall response strategy and manages the distribution of resources from a command post. Using small cheap sensors for delivering useful information such as location of firefighters in a structure fire and temperature at various locations in the structure, we aim to provide a visual display for the Incident Commander to support the management of personnel and other resources. Another application, the Buddy System, aims to support the maintenance of firefighter proximity so that they do not become separated from the team and lost in structure fires. By augmenting their existing work practices, we inform the future development of emergency response context-aware computing systems.

Biography

While pursuing simultaneous degrees in Cognitive Science and Psychology at the UC Berkeley, I began research in the Group for User Interface Research (GUIR) in 2001, which turned out to be the most intense and rewarding experience I have had as an undergraduate. I co-authored a publication at the Human Factors and Ergonomics Society Conference 2002, which we presented in Baltimore. Now I am working with this project on context-aware computing for emergency response. With a few fellow undergraduate research assistants, I have founded a GUIR undergraduate reading group to support the rapidly growing GUIR community. My future work includes a Cognitive Science honors thesis that will apply cognitive psychology visual perception phenomenon to user interface design. Other future work includes the Buddy System design and user testing for the Intel Research Undergraduate Competition as well as the creation of a Berkeley Institute of Design meta-thesaurus.

Faculty Mentor: Professor James Landay
Co-authors: Xiaodong Jiang, Jason Hong, James Landay

Cross-Cultural Study of Nighttime Fears and Simple Phobias from an Evolutionary Perspective: Sexual Dinichism in Antipredatory Behavior

Cultural Differences with Respect to Daytime and Nightime Fears

Evidence in other species that ancestral behaviors can persist for thousands of years of generations prompted a study of nighttime fears in childhood as remembered by Chinese and Vietnamese adults. The rationale for studying memories of childhood is that ancestral behaviors may manifest themselves in the acquisition of specific childhood fears and simple phobias. It has been argued that hominid female ancestors built night nests in trees to avoid predators on the ground. The much larger males were less capable climbers and likely used terrestrial refuges, such as rock outcrops, to avoid predators at night. Vietnamese women reported that, as children, they were more fearful of something "scary" below their beds, whereas males were more fearful of something "scary" from the side of their beds. Unlike the Vietnamese, Chinese men and women, as children, exhibited the greatest fear from side locations, indicating cultural differences in spatial fears. With respect to house foundations, it was observed that Vietnamese boys living in raised foundations reported more fears than those who lived in low foundations, and they were especially fearful of the below location. Consistent with the hypothesis, females of both cultures feared spiders more than did males and also had a low preference for natural settings relative to their male counterparts. It was observed, however, that females and males were equally afraid of snakes.

Biography

According to Stoics, apathy meant the extinction of the passions by the ascendancy of reason. I had to find a way to ignore negative comments when I first came to America. Having gone through this experience, I find myself immensely interested in the issue of ethnic minority, especially that of Asian Americans that is often attributed to the lack of research. As an activist for Asian Americans myself, the inequality attached to Asian Americans never ceases to frustrate me. There are many instances of this. Hence, I feel a strong desire to improve this situation. And it is working with Professor Stanley Sue, Professor Nolan Zane and, of course, Professor Richard Coss that confirms my decision to pursue graduate school and then obtain a Ph.D. in social psychology and related research, especially in the field concerning Asian Americans.

Faculty Mentors: Professor Richard G. Coss
Co-author: Professor Richard G. Coss

Yung Ching (William) Chung

Major: Psychology

Research regarding issues of ethnic minorities will hopefully help break the inequality of ethnic minorities.

Analysis of HLA Class I Genes in Hepatitis C Clearance

Facilitation of a Vaccine Against Hepatitis C

Hepatitis C virus (HCV) chronically affects more than 100 million people worldwide. It causes progressive liver damage and is the principal reason for liver transplantation in America. Identifying the mechanisms of protective immunity in the ~15% of people who clear acute HCV infection is an essential precursor to vaccine development. Major histocompatibility complex, also called human leukocyte antigen (HLA), class I molecules present viral peptides to cytotoxic lymphocytes (CTL). Our previous studies in chimpanzees suggest that shared histocompatibility class I alleles and a diverse initial CTL response contribute to HCV clearance. The co-dominant and remarkably polymorphic HLA genes express up to six different class I molecules that each bind a unique set of viral peptides. We sequenced the HLA class I genes in three people who naturally resolved acute HCV infection. One resolver possesses the HLA alleles A*2901, A*3101, B*0706, B*4402, Cw*0501, and Cw*15052. Expression of individual alleles in class I deficient cell lines establishes a target system for assays of CTL responsiveness. This identifies antigen-producing allotypes and their bound HCV peptides. Structural and functional comparison of HLA types permit discrimination of their relative roles in successful versus failed HCV responses.

Biography

Julie Tran attends UC Davis and will graduate with a B.S. in June. She majors in Biology with an emphasis in Medical Microbiology. A Regents' Scholar, Tran began work in the laboratory as a freshman. She has conducted research on lung epithelium irritants, liver cell immortalization, and hepatitis C resolution. She emigrated from Vietnam by boat and is the older of two children in a single-mother home. Tran hopes to pursue dual M.D./Ph.D. degrees after her undergraduate studies. As a UC LEADS scholar, Tran assisted in Dr. Mark Zern's laboratory at the Transplant Research Program. She co-authored an abstract in an article published in a peer-reviewed journal. She also worked in Professor Stewart Cooper's laboratory at UCSF. Using her experience from the Biology Undergraduate Scholars Program, she co-authored a successful mini-grant for breast cancer awareness. For recreation, Tran enjoys exercise, volunteer work and cultural perfomances.

Faculty Mentor: Professor Stewart Cooper
Co-authors: Brigid Boland, Ann Erickson

Julie Mai Tran

Major: Biological Sciences

Undergraduate research introduced me to the passion of scientific investigation, a key motivation for my career goals.

UNIVERSITY OF CALIFORNIA
UCD

Emily Beth Slusser

Major: Psychology

Various research assistanceship positions stimulated my own research questions and as a result I began proposing research studies of my own.

Early Childhood Gender Differences in Various Dimensions of Social Behaviors

Investigations of Frequencies and Types of Female Antisocial Behaviors

Do boys really misbehave more often than girls? To answer this question I have decided to investigate the gender differences in social behaviors displayed by preschool children. Of particular interest to this study are gender differences in the frequency of antisocial behaviors when those behaviors are classified along two dimensions: 1) overt versus covert behaviors and 2) verbal versus nonverbal behaviors. My hypothesis is that boys may seem to show more antisocial behaviors because their misbehaviors are physical and overt, where the misbehaviors of girls may be overlooked because they are verbal and covert. I recruited blind observers who collected data by recording the social behaviors of 21 male and 18 female children during outdoor playtime over a 2-week period. It was observed that girls are more likely to display prosocial behaviors while boys are more likely to display antisocial behaviors on the playground. When using a log-linear model and an analysis of variance to analyze the data, results confirm the hypothesis that female antisocial behaviors are covert and verbal in nature, while male antisocial behaviors are overt and nonverbal in nature. The statistical analyses further reveal that while children's antisocial behaviors are significantly different in nature, their prosocial behaviors are more evenly distributed across all investigated classification dimensions. Taken as a whole, the outcome of this study reveals that the nature of antisocial behaviors differ systematically between the genders. This information may prove useful by helping teachers and childcare workers in both predicting and dealing with conduct problems displayed by either gender.

Biography

I am currently an undergraduate student at UC Irvine majoring in Psychology, with an emphasis in child development and neurobiology, and minoring in Education. My job experience has involved working with children, as I taught ballet, gymnastics, swimming and rock climbing to young children and worked for a YMCA day camp as a counselor and a director for three years. All of these experiences have served to strengthen my passion for interacting with and counseling children, especially children with social, psychological or conduct problems. I am an Honors Psychology student, a member of Golden Key Honor Society, Psi Chi National Honor Society, and the ASUCI Psychology Student Association. I am a Summer Undergraduate Research Fellowship recipient, which has funded my ongoing observational research study on the social behaviors of preschool aged children. I am also participating in an internship as an observer of preschool and elementary school children's classroom behaviors.

Faculty Mentor: Professor Virginia Mann

Michael Williams

Major: Computer Engineering

Involvement in research as an undergraduate has provided me with numerous benefits that will prove invaluable as I continue my education in graduate school.

A MEMS-Based Telemetry System for Longitudinal Muscle Contractions in the Human Esophagus

Providing a Way to Directly Measure Muscle Contractions

The long term goal of this work is to develop an implantable micro-scale sensor, capable of measuring esophageal muscle contractions, based on MEMS technology. The initial design of such a device has been explored in this project. Currently there are no effective methods of measuring longitudinal muscle contractions in the esophagus. Utilization of a MEMS-based telemetry system for health monitoring will allow for a more accurate characterization of longitudinal muscle contraction patterns within the esophagus. MEMS accelerometers are low cost and low power devices with sufficient sensitivity for the measurement of muscle contractions. Integrating an accelerometer with a suitable power source and biocompatible packaging along with extensive testing via a sensor-computer interface will be the first steps to developing a fully implantable MEMS-based telemetry system.

Biography

Michael Williams is currently an undergraduate working toward a Bachelor of Science degree in Computer Engineering at UC Irvine. He is originally from North Carolina, but he currently resides in Oceanside, CA. Michael's father is a member of the United States Marine Corps, which required his family to move every few years. Michael believes that these experiences are the main contributor to his joy of traveling to new places and exploring new environments. During his free time, Michael enjoys being outdoors and participating in outdoor activities such as boating, snowboarding and cycling. Upon completing his undergraduate education, Michael plans to enter graduate school and study Microelectromechanical Systems (MEMS) or microelectronic devices. With his graduate degree he plans to become involved in the research and development of MEMS or solid-state devices.

Faculty Mentor: Professor Andrei Shkel

Black, White, or Gray: A Historiography of the Duality of Afro-American Religion

Tracing the Role of the Church in the Afro-American Community Back to its Origins

Meredith Maguire and W.E.B. Dubois have argued that African American religion serves to either support the status quo or promote social change. This project investigates the historical origins of African American Protestantism, its development and its current status in light of the dual nature that religion plays within the African American community. The questions that serve as the focus of my research are: "What impact did African religion have on the formation and role of African American Protestantism within the slave community?", "What are the similarities and differences between the structure, function and role of the church during slavery, reconstruction, the civil rights movement and today?", "What impact does the general society have in determining the role of religion within the African American community?", and "Given the dual aspects of African American religion, what is the role of the church leader in promoting this dichotomy?" My textual research is divided into four areas: slavery, reconstruction, the civil rights movement and today. My social research is divided into two areas: interviews and direct observations. For the interview component of my social research, I am interviewing church members affiliated with the African American Protestant Church. The interviews aid in making the connection between the dual natures of religion within today's African American community. My direct observation includes investigating church activities within their immediate communities. This data will then be analyzed against the information collected from my textual research to formulate my senior thesis and answer the proposed questions above.

Biography

I began my college career at Howard University; however, as a first generation college student from a lower middle class family, it became increasingly difficult for my family to manage my educational expenses. I decided to move to California to continue my education at a public institution. I attended El Camino College to finish my general education requirements and transferred to UCLA in 2001 as a History major. While attending UCLA, I have maintained an overall 3.5 GPA. I have also gained membership into the Golden Key International Honour Society and Phi Alpha Theta History Honor Society. I have traveled to China as a peace ambassador and have been awarded the Wasserman Research and John C. Cook Scholarships. I will be graduating this spring with departmental honors. My future goals include attending a graduate program in urban schooling and pursuing a career in education research and policy.

Faculty Mentor: Professor S. Scott Bartchy

Tauheedah Baker-Jones

Major: History

Upon completion of my honors thesis, I feel confident that I will excel in my graduate studies and achieve my long-term career goals.

A Study of the Oxidation of DNA: Oxidation of 8-Oxo-Guanosine by Singlet Oxygen

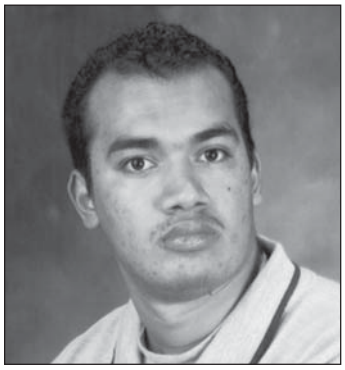
Studying DNA Damage from Oxygen

One of the main products of singlet oxygen mediated damage to DNA is 8-oxo-7,8-dihydroguanosine (8-OxoG). It has been suggested that 8-OxoG is susceptible to further oxidation and is actually more reactive than guanosine. We are currently studying singlet oxygen mediated decompostion of 8-OxoG in an attempt to elucidate the mechanism of its photooxidation. Previous studies on the photooxidation of 8-OxoG derivatives have led to the identification of several decomposition products including parabanic acid and cyanuric acid. We are currently characterizing another decomposition product, a spiroiminodihydantoin nucleoside, which is believed to be the main oxidation product present from the methylene blue sensitized reaction of singlet oxygen and guanosine. This spiroiminodihydantoin product has been identified as the main product in both one electron and peroxynitrite oxidations of acetyl-protected 8-OxoG derivative. We are interested in isolating and characterizing the spiroiminodihydantoin nucleoside. We have successfully synthesized TBDMS-protected 8-OxoG using a four-step synthesis. The TBDMS-protected 8OxoG derivative was photolyzed using a Cermax high intensity lamp in the presence of a sensitizer, with oxygen bubbling through the reaction mixture, facilitating the formation of singlet oxygen. The resulting decomposition products were analyzed using LC-Mass Spectrometry, and preliminary results indicate the presence of the spiroiminodihydantoin compound. By identifying the spiroiminodihydantoin nucleoside products of the singlet oxygen mediated oxidation of 8-OxoG, we hope to tie together the mechanisms of singlet oxygen and one-electron oxidation.

Biography

I am a senior at UCLA where I am currently majoring in Chemistry. I enjoy studying chemistry because there is so much continual knowledge and the field is constantly changing. I have many interests besides chemistry. First, I love to exercise and play sports. I lift weights, run, swim and play basketball as much as time will permit. I am an avid sports fan and enjoy rooting for my favorite teams. Besides those physical activities, I love to travel and explore new places. Some places I would like to visit over the next few years are Europe, Australia and the Amazon rainforest. During my spare time I enjoy reading a good mystery novel, comic book or watching an action-packed movie.

Faculty Mentor: Professor Christopher Foote
Co-authors: Christopher Foote, Jeremy McCallum



Miguel A. Jimenez

Major: Chemistry

Early exposure to state of the art instruments is a luxury that I otherwise would not have had were it not for undergraduate research.

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Lynell Gutierrez

Major: Chemical Engineering

Undergraduate research has motivated me to continue my degree in engineering and to pursue a doctoral degree in bioengineering.

Patterned Neural Networks for Detection of Brain Functions

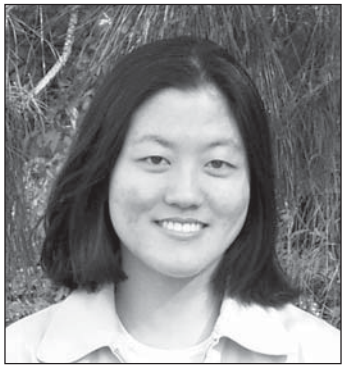
Studying Brain Functions and Future Development of Dementia

Over twenty million people across the world suffer from different types of dementia. Fifteen percent of the population over the age of sixty-five suffers from dementia; the percentage rises to thirty after the age of eighty. In general, the main cause of dementia is the lack of communications between neurons. This could be due to storage of undesired proteins or chemicals between neurons or other undiscovered reasons. Since neural communication is mainly based on electrical signals due to changes in the chemical environment around the neuron, the project aim is to study the behavior of an in-vitro electrode array-based system of neurons in a network form. Forming a controlled neural network requires tight control of axon growth between adjacent neurons within an array. To this end, we applied electric field between adjacent electrodes to promote directional axon growth parallel to the direction of electric field inside the buffer solution. For this we applied bias of 0.4-1V between Platinum deposited electrode arrays of 80μm diameter and 200μm in spacing. Our primary data illustrates a tendency of preferential growth of axon parallel to e-field direction. Similarly, an alternative approach is being applied for directional growth of axons. This technique involves micropatterned surfaces with various surface topologies. Our preliminary results using 2μm pillar lines separated by 2μm wide trenches showed favored growth of axons along the lines. Currently, we are working on assembly of a 2x2 neural networks using these techniques for applications in biosensing and brain-on-a-chip.

Biography

I am a third year biochemical engineering student at UC Riverside. For the past seven months, I have been working with Dr. Mihri Ozkan on "Patterned Neural Networks" through participation in research offered by University of California-Leadership Excellence through Advanced Degrees (UC LEADS). Also, currently I work as a peer mentor in the Academic Excellence Program with Bourns College of Engineering. I have had the opportunity to present my work at the Bourns College of Engineering Industry Day (2002). I am an active member and currently serve as co-president of the UC Riverside student chapter of the Society of Women Engineers, and a founding member of the UC Riverside Materials Research Society student chapter as co-treasurer. I will graduate in June 2004 and will attend graduate school where I plan to obtain a doctoral degree in bioengineering.

Faculty Mentor: Professor Mihri Ozkan
Co-author: Shalini Prasad



Star Lee

Major: Neuroscience

I have found research to be challenging, as it requires both creativity and patience.

NMDA Receptors Mediate Feeding Elicited by NPY in the Lateral and Perifornical Hypothalamus

Providing a Better Understanding of Natural Feeding

Neuropeptide Y (NPY) and N-methyl-D-aspartate (NMDA) are believed to be involved in regulating feeding behavior in the lateral (LH) and perifornical hypothalamus (PFH). Injections of NPY and NMDA receptors, the NMDA receptor antagonist D-(-)-2-amino-5-phosphonopentanoic acid (D-AP5) or 7-chlorokynurenic acid (7-CK) was injected five minutes prior to the NPY in the LH or PFH of satiated rats, and the subsequent food intake was measured 1, 2, and 4 hours post injection. D-AP5 (1, 10, or 20 nmol/0.3 μL aCSF) in a dose-dependent manner. Compared to an average food intake of 1.3 grams from an injection of aCSF, the injection of NPY alone in the PFH produced an intake of 9.7 grams in four hours. Parallel results were seen in the LH. Illustrating the specificity of the NMDA receptor antagonist, D-AP5 suppressed NMDA-elicted feeding, but failed to suppress feeding induced by kainic acid. Consistent with the results of D-AP5, the NMDA receptor antagonist 7-CK (40 nmol/0.3 μL dimethyl sulfoxide) suppressed feeding elicited by NPY in the LH by 85%. Collectively, the findings suggest that the feeding elicited by NPY is dependent upon the activation of the NMDA receptors in the LH and PFH.

Biography

I was raised in the South by a single mother who always stressd the importance of academics. I attended a private boarding school for high school where I learned to be greatly independent. I moved to California to attend UC Riverside where I am majoring in neuroscience. After my sophomore year, I began conducting research in a neuroscience lab, which has been a great experience thus far. I recently presented my work at the Society for Neuroscience meeting. Currently I am balancing my time between jobs, community service, research and academics. I am involved in the UC LEADS program (UC Leadership through Advanced Degrees) and plan to attend graduate school to pursue my doctorate in neuroscience.

Faculty Mentor: Professor Glen Stanley
Co-author: Glen Stanley

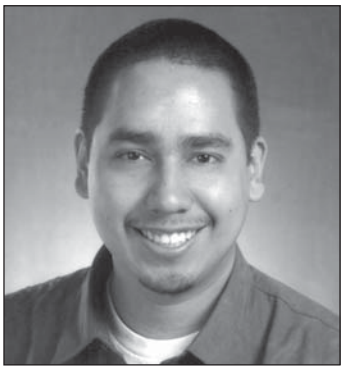
Migrant Farm Workers' Struggle for Survival: Alcohol Use and Abuse in Mecca, California

Understanding the Agricultural Work Force in California

My research aims to investigate the various social problems that arise among high-intensity migrant farm laborers. In particular, my research addresses the high level of alcohol use in the farm working community, and how through the use of alcohol migrant farm laborers form resistance to and escape from everyday pressures. As racial others, as immigrants, and as people who speak limited English (or no English), it is important to understand their role in one of the most demanding labors in the United States. Furthermore, it is important to see how farm laborers develop their own unique (and contradictory) identity and safe-havens in society. As a community, farm workers reclaim dignity through the use of alcohol; however, what is dignity? How is it defined differently through time? When is too much alcohol detrimental for the community? Through a case study of the Riverside Latino Commission on Alcohol and Drug Abuse Services and Mecca, California as well as proposed public policy, the use of alcohol in migrant farm working communities is examined. This project also contains testimony from migrant farm workers who engage in drinking and farm workers who have been victims of alcohol dependence. My research is unique because it explores a labor force that is often taken for granted and goes unrecognized.

Biography:
I am a first generation college student and the son of migrant farm laborers. This has shaped my academic and career aspirations, including my research project. The life of a migrant student is never easy because one's parents constantly move between different farming communities in order to best provide for their family. The experience I have lived has opened my eyes to many of the conditions facing Mexicano/Chicano peoples in the US Southwest, and has also granted me a sense of strength and pride allowing me to succeed. By learning about the history and struggles of migrant laborers, I was able to appreciate my education and overcome many of the barriers that my community faces. The experience and challenge of being a migrant student has motivated me to pursue a Ph.D. in Social Anthropology, and I am currently in the process of applying to graduate schools. My education will provide the basis for doing research in the Mexicano/Chicano farm labor community and help me to empower this community in their historic fight for rights, resources and recognition.

Faculty Mentor: Professor Robert R. Alvarez



Ernesto Martinez

Major: Ethnic Studies and Economics

By gaining an understanding of different communities through further research, I hope to be able to better society through the application of public policy.

Control of Etch Parameters in Optical Nanostructures Using CAIBE

Improvement of Small-Scale Etching for Optical Materials

Optical nanostructures - including form-bifringent materials, photonic crystals, and resonant optical microcavities - hold great promise as a technology to facilitate on-chip integration of large-scale photonic systems, as well as to enable the development of novel photonic devices based on near-field optical phenomena. However, to realize these advanced devices and structures, numerous advances in nanoscale etching technologies and techniques are needed. One critical aspect of the fabrication process is the precise control of the surface smoothness and profile in the etching of high aspect-ratio sub-micron structures. Traditional dry etching systems such as Reactive Ion Etching (RIE) are used for this purpose, but the lack of independent control of the etching mechanisms makes it difficult to fabricate nanoscale structures with the desired profile. My research presentation will be on my work with Professor Fainman in investigating the Chemically Assisted Ion Beam Etching (CAIBE) technique, which provides independent control of several etching parameters, and thus has potential for better control of the resulting submicron etch profile. The research that I will be presenting will cover my work on the characterization of the CAIBE system with respect to the controllable parameters, based on analysis of the physical stucture and optical performance of the resultant etched nanostructures.

Biography:
I am currently a senior in Electrical Engineering at UC San Diego with a focus on Photonics. I have also been a member of Phi Beta Kappa since May 2002. I entered UCSD in 1999, and since January 2002 I have been assisting with research in the Ultrafast Nanoscale Optics group at UCSD with Professor Fainman. I have been involved in research related to the fabrication and testing of various photonic nanostructures. I took part in the California Institute for Telecommunications and Information Technology Summer Research Fellowship during the summer of 2002, for which I presented my research project which pertained to the improvement of etch profiles that are able to be produced by CAIBE for form bifringent materials. I plan on continuing to pursue research in the field of photonics, with a focus on nanoscale devices. My goal is to obtain a Ph.D. in Electrical Engineering and continue to conduct research for my post-graduate work.

Faculty Mentor: Professor Shaya Fainman

Michael Moewe

Major: Electrical Engineering

I have been exposed to new cutting edge areas of research and have learned lab skills which would not otherwise be available in any lab-course classes.

UNIVERSITY OF CALIFORNIA
UCSD

Melanie Zauscher

Major: Environmental Chemistry

I believe that environmental research has the capacity to improve the way we live as well as the state of the world.

Age Determination of Bowhead Whales Through Aspartic Acid Racemization

Examining Whether Bowhead Whales have a Long Lifespan

Over a century old harpoons have been found inside bowhead whales (*Balaena mysticetus*) suggesting they can live to be over 100 years. In previous studies, the oldest bowhead whale dated was 211 years when it died. These findings drew interest in determining what age bowhead whales can reach. Dating methods using the racemization of chiral amino acids have been widely used. The racemization of aspartic acid in the lens of their eyes was used to date 52 bowhead whales. Preliminary results show that more than 2/3 of the samples studies were less than 30 years old, while about 5% were over 100 years old. The oldest whale in our study was 120 years old. Due to commercial whaling, which was allowed up to the 1930's, the study found very few individuals over 70 years old. From studying the lifespan of bowhead whales we can learn how policy has affected this endangered species.

Biography

Born and raised in Columbia, South America, Melanie Zauscher was always curious about the way the world worked. After graduating high school, she moved to California to further her education. She began at a junior college, took a year off to do community service though AmeriCorps, and transferred to UC San Diego in the spring of 2000. Since her beginning at UCSD, she has tried to stay active at campus, working for the California Alliance of Minority Participation in the Sciences doing research at Scripps Institution of Oceanography and the Chemistry Department. Currently she is a teaching assisitant for a lower division chemistry class. Additionally, Melanie is an active member of UCSD's Center for World Democracy and Peace Coalition. She studies environmental chemistry and will graduate in winter 2003. Melanie is interested in pursuing a higher degree in environmental sciences, with the goal of improving our daily lives and, in turn, the planet.

Faculty Mentor: Professor Jeffrey Bada
Co-authors: Maria Young, Oliver Botta, Cheryl Rosa, Jefferey Bada

Is There a Link Between Eutrophication and *Pseudo-nitschia Multiseries* Blooms?

Identifying Key Factors in Toxic Bloom

Due to the increased levels of organic and inorganic nitrogen from anthropogenic eutrophication, much effort has gone into studying possible effects on phytoplankton. This study intends to test whether the growth of *Pseudo-nitzschia multiseries* is enhanced by the addition of organic nutrients under various light conditions. Previous studies have shown that phytoplankton can use DON and that *P. multiseries* can use organic nutrients for growth (Palenik *et al*., 1990, Hillebrand and Sommer, 1996, Sietzinger *et al*., 1997 & 2002). Examining the heterotrophic abilities that this species has in the dark will further the knowledge of the link between eutrophication/runoff and bloom initiation via the extended survival of a "seed population". This is especially important since *P. multiseries* is a marine planktonic diatom that produces the neurotoxin domoic acid. This neurotoxin is potentially deadly to humans and other marine animals when consumed via contaminated shellfish and fish such as anchovies (Mos, 2001). Consequently, *P. mutiseries* can potentially cause large economical, social and environmental impacts. Therefore, this study will present results from organic and inorganic nitrogen addition experiments under light/dark conditions to verify that growth is enhanced by these organic nutrient additions.

Biography

My dream of being a scientist came true when I transferred to UC Santa Barbara from Santa Monica Community College. At UCSB, where I majored in Environmental Studies and Geography, I have gained the knowledge to recognize some of the major issues that affect the environment. One of my goals in life is to gain the valuable tools to solve the issue of degradation in coastal areas. In doing so I will have the chance to realize my vision of developing better housing that does not harm the environment as it has been done in the past. The environment gives so much to us, yet most of the times we fail to recognize it. A healthy environment has the ability to give us water, food and sometimes peace of mind.

Faculty Mentors: Professor B.B. Prézelin
Co-authors: C. Mengelt, B.B. Prézelin

Roxana Hernandez

Major: Environmental Studies / Geography

I will be providing my community with a service by which their needs and those of the environment will be met.

Xenophobia, Anti-Unionism, and Anticommunism: The Red 'Scare' in Los Angeles, California, 1919-1920

Relating the Importance of Los Angeles to a Larger Event in American History

On January 2, 1920, thousands of people were simultaneously arrested across the country in thirty-three different cities. In the days following the "Palmer Raids," innocent Americans awaited an uncertain fate in abhorrently inhumane conditions. Robert K. Murray's seminal work in the 1950s concluded that repression of 1919-1920 was a byproduct of public hysteria triggered by key events and underlying bias. Elements of this analysis persisted until very recently, hence the name Red "Scare." Recent reinterpretation challenges that it was driven by "mass hysteria," but instead describe the mechanisms that created and sustained the Red Scare as rational and self-interested. Los Angeles is an example for scholarly research because it reconciles its unique progressive history to these underlying mechanisms driving the Red Scare. Los Angeles' proprietorial elite, enabled by a xenophobic pliable public and significant financial resources, eliminated threats to the status quo under the guise of anticommunism. Proprietorial elites' connection to zealous patriots, radical xenophobes, politicians, law enforcement, the Bureau of Investigation and the media facilitated their efforts to purge the city of radicals, foreigners, and union members. Business leaders during the Red "Scare" successfully used anticommunism as a means to achieve a fiscally beneficial end. With recently released files from the National Archives in Washington, D.C., as well as untapped archives in Los Angeles, this study hopes to shape scholarly interpretation of the Red Scare and anticommunism, as well as contribute to Los Angeles' understudied municipal history.

Biography

Roger Thompson is a Regent Scholar working on his Senior Honor's Thesis at UC Santa Barbara. Thompson transferred from Monterey Peninsula College where he served on the Board of Trustees and the Academic Senate. At UCSB, he serves on periodic student panels to discuss the benefits of undergraduate research to prospective transfer students. He attends occasional conferences to discuss his work with prospective Regent Scholars and recently published an article on his transfer experience. However, most of his time is spent researching. His research on the Red Scare began in Spring 2002 under Professor Nelson Lichtenstein. He received the Honor's Program Award to support work at the National Archives in Washington, D.C. He also published an article in the UCSB Law and Society Review Journal entitled, "Legislation from the Past Speaks to Us Today: The Mindt-Nixon Bill" (Spring 2002). He will graduate this spring. He is happily married to Christi.

Faculty Mentor: Professor Nelson Lichtenstein

Roger Thompson

Major: History

Undergraduate research has shown me that I have no qualms about committing myself to a life of academic work, because I derive such pleasure in research.

UNIVERSITY OF CALIFORNIA
UCSB

Max Bell Alper

Major: American Studies

I know that the skills I am learning through my research will serve as a strong foundation for both future employment and graduate school.

En/Abling Technologies in Dis/Abling Structures

Examining the Interplay Between Disability, Technology and Conceptions of Identity

My research project "En/Abling Technologies in Dis/Abling Structures" seeks to critically examine the complex interplay between theories of disablity, discourses in technology, and conceptions of identity. Many new technologies have been developed and marketed on the basis of their ability to enable people with disabilities (giving vision to the blind through digital eyes or mobility to the paralyzed through stem cell research). But how do these technologies circulate through society in multiple and contradictory ways? On the one hand, I seek to understand not only the material technology, but also more importantly the discourses surrounding the technologies - the stories that we tell. Asking the question, how do theories of disability embedded in these discourses come to constitute and define disability? On the other hand, I am also interested in the daily experiences of many people with disabilities who have extremely intimate relationships with technologies. In other words, how can (and do) people with disabilities redefine dominant notions of disability, technology and identity through their everyday lives? These questions take on a deeper importance as we seek to make sense of our increasingly technologized world, which in large part is being defined for us by corporate and elite scientific interests. As such, my project seeks to draw out a potential site of contestation to this logic - the active role that some people with disabilities take in reconstituting technological discourses for themselves. Resisiting both the blind faith of techno-utopianism as well as the doomsday rhetoric of techno-phobia, I search for a critical understanding of disability, technology and identity.

Biography:

Originally from Chicago, Max Bell Alper briefly attended Hampshire College in Amherst, Massachusettes before transferring to UC Santa Cruz in the fall of 2000. Last year, a research project of Alper's on questions of animal welfare in biotechnological research was recognized with a Dean's Undergraduate Award. This year, he was awarded the University of California Regents Scholarship and is serving as a student representative in the American Studies Department. His academic/activist interests include the social studies of science and technology, democratic unionism and the cultural politics of animals. Alper currently lives in an old farmhouse in the Santa Cruz Mountains with his partner and their dog.

Faculty Mentor: Professor Catherine Ramirez

Winnie Chan

Major: Molecular, Cellular & Developmental Biology

I have been working in the lab for almost a quarter, and I have now become a person with confidence that the career I chose is going to make me happy.

Identification of Cytoplasmic Tail Sequences that Regulate Class I MHC Recruitment into the Immunological Synapse and T-Cell Activation

Developing Novel Immunotherapies for Medical Conditions

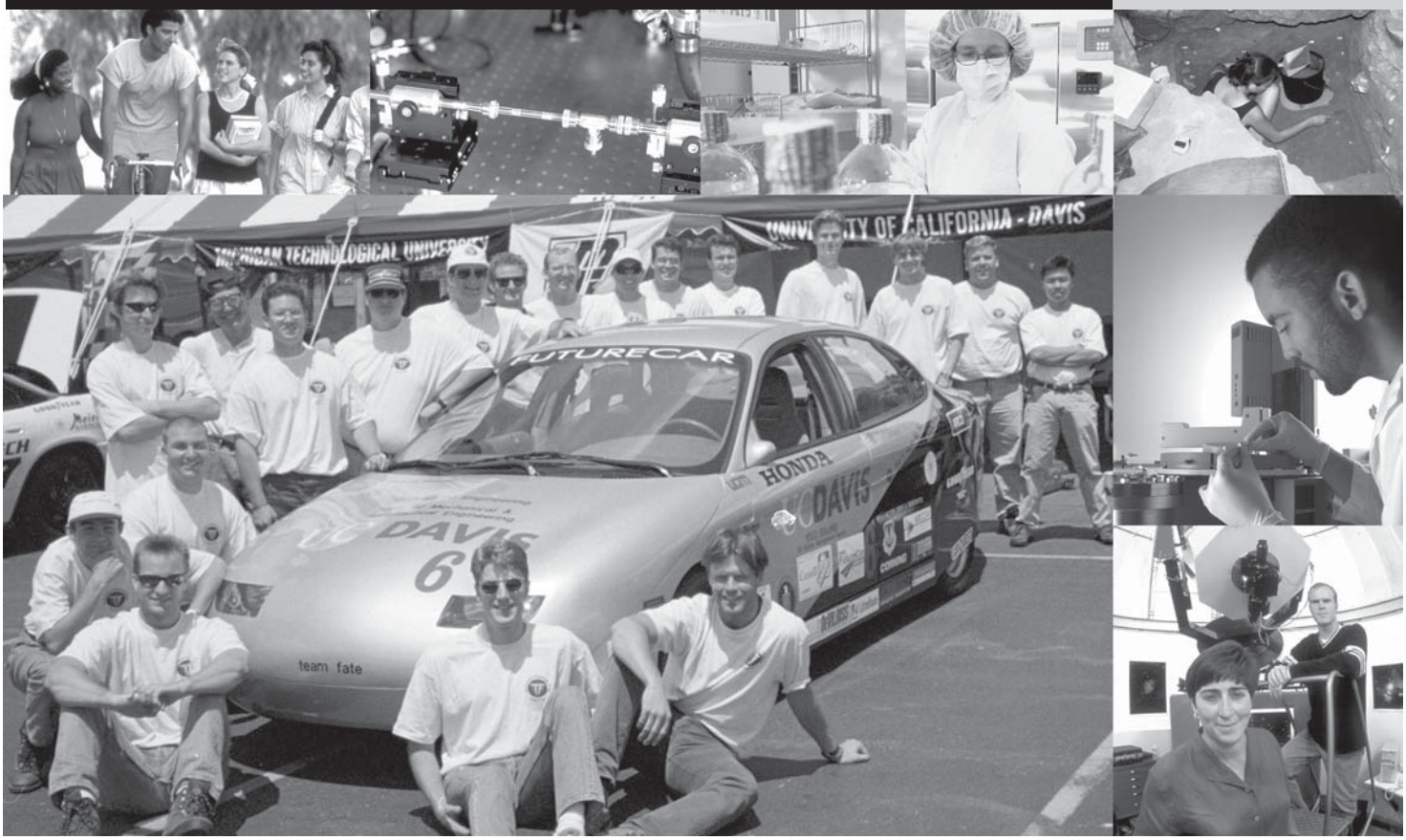
Class I Major Histocompatibility Complex (MHC) molecules are immunologically important in that they present antigenic peptides to cytotoxic T cells (CTLs). When T-cell receptors interact with a specific MHC-peptide combination on an antigen presenting/target cell (APC), the molecules cluster into a specialized junction called the immunological synapse. The CTLs then attack and kill the target cells that display that peptide-class I MHC complex. The formation of an APC-T-cell conjugate requires lateral mobility of class I MHC molecules into the immunological synapse, almost certainly by a cytoskeleton-regulated mechanism. This lab's previous studies showed that class I MHC molecules with 7 amino acid cytoplamic tails and wild-type molecule with 31 amino acid (full length) cytoplasmic tails are more restricted in their lateral mobility on the membrane than are class I MHC molecules with 0 or 4 amino acid cytoplasmic tails. Further analysis of a new set of seven cytoplasmic tail mutants revealed subtle differences in the lateral diffusion of class I MHC on the plasma membrane. However, the ability of these different cytoplasmic tail mutants to cluster into immunological synapses was not examined. Our hypothesis is that regulated mobility of class I MHC molecules on the APC membrane allows their recruitment into the immunological synapse and hence T-cell activation. In this study we are using immunofluorescence microscopy and functional assays on APCs expressing these 7 different cytoplasmic tail mutants of class I MHC to identify features in the cytoplasmic tail that regulate clustering of MHC into immunological synapses and T-cell activation.

Biography:

I was born and raised in Rangoon, Burma, until I was 17. I finished high school in Burma with distinctions, so I could go to a medical school. Just before I started attending Rangoon Institute of Medicine, I had a chance to come to the United States. When I arrived in the U.S., I attended Foothill College where I fulfilled the requirements towards a major in Biology in order to transfer to UC Santa Cruz. I'm now a senior majoring in Molecular, Cellular and Developmental Biology. I'm taking upper division major courses and working on my undergraduate thesis research in the laboratory of Dr. Martha Zuñiga. I am expecting my Bachelor of Science degree in June 2003.

Faculty Mentor: Professor Martha Zuñiga
Co-author: Martha Zuñiga

A Formula for Success



Activities for UC students include classes, public service and research, whether in the lab or as shown above with the UC Davis FutureCar Team surrounding their electric hybrid design.

Research at the University of California

Under the California Master Plan for Higher Education, the University of California is the state's primary research institution. Because of this role, UC fulfills its mission of research, education and public service by weaving research into the fabric of all its contributions to California. From the training of young engineers to providing the latest medical therapies for hospital patients, UC's research mission enhances everything that it does.

Education

- Every year, thousands of UC undergraduates are exposed to research through internships, projects, scholarship programs and seminars. UC's one million alumni have gone on to become teachers, designers and writers, justices and jurists, engineers, architects and renowned scientists.
- UC undergraduates are responsible for editing and overseeing production of four professional-quality journals devoted exclusively to publishing results of undergraduate research.

Economy

- The University of California boosts the state economy by attracting almost $2 billion annually in federal research funds. Without California's investment in UC research facilities, these federal awards – and the resulting tech transfer and job creation – would go to other states.
- There are more than 30 UC research centers around the state dedicated to improving the production, supply and quality of food and fiber, as well as the health and safety conditions on California farms. The average return for public investment in UC agricultural research and extension activities is about 20 percent.
- Private companies and consortia contract with UC to perform over $180 million of research annually. This research helps create new products, improves productivity and leads to the creation of well-paid jobs in California.
- Over 160 companies have been founded on UC-bred technology. The UC technology transfer program leads U.S. universities both in the number of patents granted and in the number of successfully commercialized inventions.

Undergraduate Research at the University of California

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For more information

http://www.ucop.edu/research

http://www.ucday.org